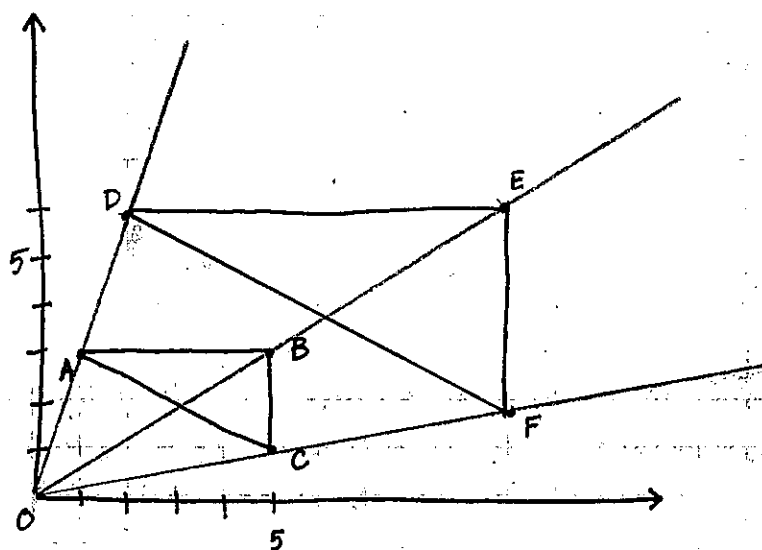


Dilations

1/20/2015

A dilation is a transformation that produces an image that is the same shape as the original but a different size.

Dilations in the coordinate plane:



Step 5:

$$AB = 4$$

$$BC = 2$$

$$DE = 8$$

$$EF = 4$$

$$\frac{DE}{AB} = \frac{8}{4} = 2$$

$$\frac{EF}{BC} = \frac{4}{2} = 2$$

* What are the coordinates of point A?

Point A: (1, 3)

Point D: (2, 6)

* What do we notice?

Do we really need a compass? No!!

A scale factor of a dilation is the ratio of a side length of the image to the corresponding side length of the original figure.

$$\text{scale factor} = k$$

Notation: $(x, y) \rightarrow (kx, ky)$

* If k is greater than 1, image is enlarged

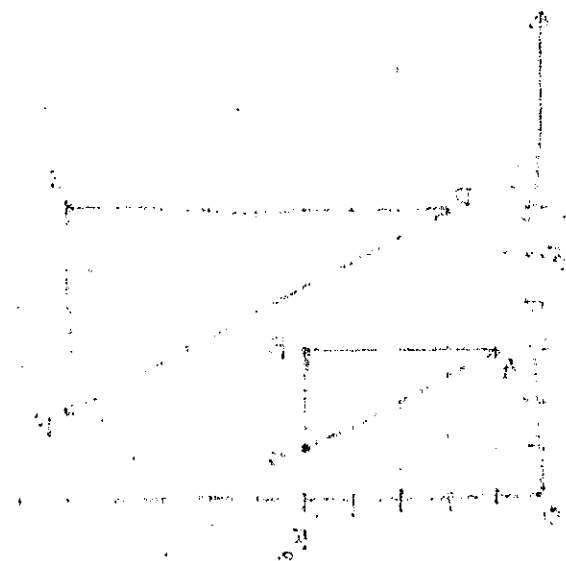
* If k is between 0 & 1, image is a reduction

* If k is equal to 1 ... what do you think?

center of dilation is a fixed point in the (coordinate) plane about which all points are expanded or contracted. It is the only fixed point that does not change, move under a dilation.

$$S = \frac{8}{3} = \frac{48}{9}$$

$$S = \frac{1}{3} = \frac{34}{102}$$



According to the definition of dilation, (A, A') and (B, B') are dilations of the same center.

$$(A, A') \sim (B, B')$$

Therefore, A, A', B, B' are collinear.

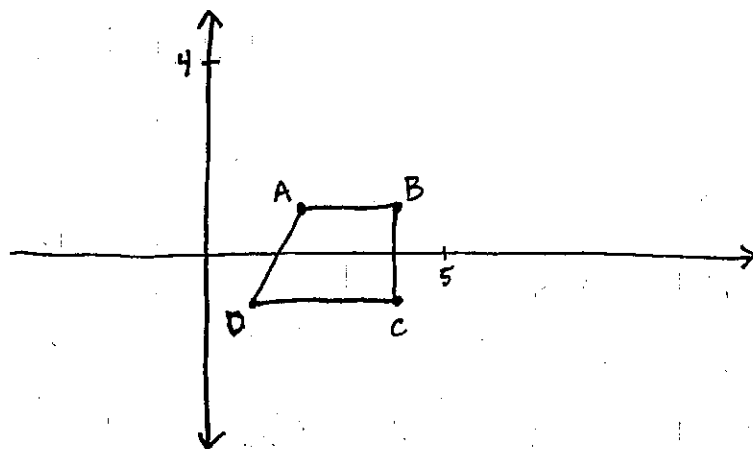
Similarly, A, A', C, C' are collinear. Therefore, A, A', B, B', C, C' are all on the same line passing through the center of dilation.

$$(A, A') \sim (B, B') \sim (C, C')$$

Therefore, A, A', B, B', C, C' are all on the same line passing through the center of dilation.

Significance: The center of dilation is the only point that remains fixed.

Example 1 Draw a dilation of quadrilateral ABCD with vertices $A(2,1)$, $B(4,1)$, $C(4,-1)$, and $D(1,-1)$ use a scale factor of 2 and label the vertices L, M, N, P.



$$(X, y) \rightarrow (2x, 2y)$$

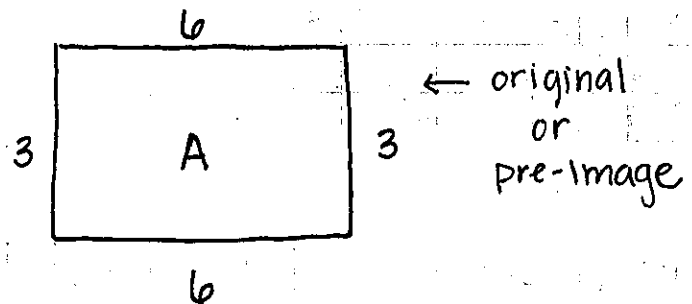
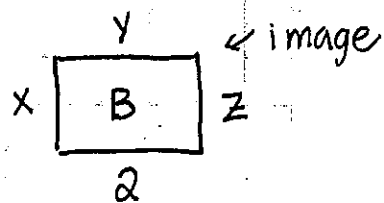
$$A(2,1) \rightarrow L(4,2)$$

$$B(4,1) \rightarrow M(\quad)$$

$$C(4,-1) \rightarrow N(\quad)$$

$$D(1,-1) \rightarrow P(\quad)$$

Example 2 Determine whether the dilation from figure A to Figure B is an enlargement or reduction. Then find the values of the variables.



$$\frac{2}{6} = \frac{1}{3}, \quad k = \frac{1}{3} \quad \text{so... it is a reduction}$$

$$3(\frac{1}{3}) = 1 \quad x, z = 1$$

$$6(\frac{1}{3}) = 2 \quad y = 2$$